Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (2011 to 2017) (Sem.–1,2)

ENGINEERING CHEMISTRY

Subject Code : BTCH-101

Paper ID : [A1106]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B &C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

Q1. Answer briefly :

a) How ^{1}H NMR can be used to distinguish p-$CH_3C_6H_4CH_3$ from $C_2H_5C_6H_5$?

b) What is the range of peak identification region in IR spectrum?

c) Milliequivalent per litre of hardness = _____ ppm. Explain.

d) What is photovoltaic cell?

e) What is green solvent?

f) What is waterline corrosion?

g) Polymers have average molecular weights. Explain.

h) Define nanochemistry.

i) What can be made from petrochemicals?

j) What is quantum yield? (10×2=20)

SECTION-B

Q2 a) Draw a neat and well labeled diagram of UV-Visible spectrophotometer. Name the light-source for UV and visible range of electromagnetic radiations in this instrument? Name the materials used as sample-holder for the UV and visible regions of electromagnetic radiations. (4)

b) What do you understand by equivalent and non-equivalent protons? Explain with the help of examples. (2)

c) What is the standard reference used for measuring chemical shift and why? (2)

Q3 a) Define Beer-Lambert law. Derive the equation. (4)

b) A 0.003M solution of $Co(NH_3)_6^{3+}$ transmits 75% of incident light of 500 nm if the path length is lcm. Calculate the extinction co-efficient and the percent absorption for a 0.01M solution. (4)

Q4 a) Calculate the amount of soda and lime required for softening 25000L of water. The quality control lab has reported following salts and their quantities: $Ca(HCO_3)_2$ = 15mg, $Mg(HCO_3)_2$ = 10mg, $MgSO_4$ = 18mg, $CaSO_4$ = 20mg, $CaCl_2$ = 8mg and NaCl = 4mg. (Atomic Weight of Ca = 40, Mg = 24, Cl = 35.5, Na = 23, S=32, O=16, H=1) (5)

b) What advantages does the use of *"ion-exchange resin"* provide over *"zeolite process"* for softening of hard water? (3)

Q5 a) What is atom economy? How it is different from percentage yield? (4)

b) What are ultrasounds? How ultrasound waves can help the chemical reaction? (4)

SECTION-C

Q6 a) How corrosion can be prevented by proper designing? (4)

b) Discuss the mechanism of wet corrosion. (4)

Q7 a) What do you understand by tacticity? How it can affect the properties of polymers? (4)

b) If 1000 g of a polymer with molecular weight 1000 g/mol and 1000 g of another polymer with molecular weight 10^6 g/mol are mixed, calculate the polydispersity index of the polymer? (4)

Q8 a) Describe two dimensional assemblies. (4)

b) What are nanoscale materials? Why are nanoparticles so important? (4)

Q9 a) What is the composition of crude oil? Discuss various petroleum products that come from crude oil. (4)

b) What are petrochemicals? Discuss second generation petrochemicals. (4)